Name: _____   Date: _____
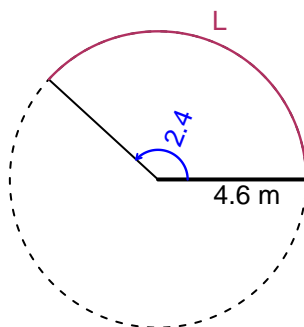
Trig Final (SLTN v635)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 4.6 meters. The angle measure is 2.4 radians. How long is the arc in meters?
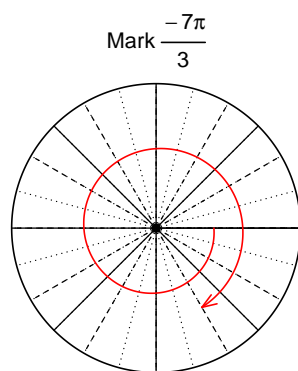

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
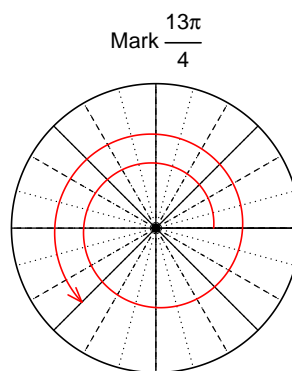
$L = 11.04$ meters.

Question 2

Consider angles $\frac{-7\pi}{3}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-7\pi}{3}\right)$ and $\cos\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-7\pi}{3}$

Find $\sin(-7\pi/3)$

Mark $\dfrac{13\pi}{4}$
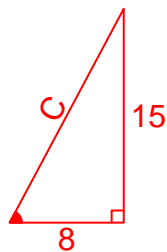
Find $\cos(13\pi/4)$

$\sin(-7\pi/3) = \frac{-\sqrt{3}}{2}$

$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-15}{8}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.
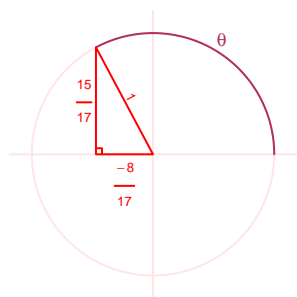

Solve the Pythagorean Equation

$$8^2 + 15^2 = C^2$$
$$C = \sqrt{8^2 + 15^2}$$
$$C = 17$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.

$$\cos(\theta) = \frac{-8}{17}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 4.89$ meters, a frequency of 7.6 Hz, and an amplitude of 3 meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -3\sin(2\pi 7.6t) + 4.89$$

or

$$y = -3\sin(15.2\pi t) + 4.89$$

or

$$y = -3\sin(47.75t) + 4.89$$